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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Eberhard Holder

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EXAMINER

BARRY, CHESTER T

ART UNIT

PAPER NUMBER

1724

DATE MAILED: 05/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/806,465

Applicant(s)

HOLDER ET AL.

Examiner

Chester T. Barry

Art Unit

1724

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 32,33,35,36,39 and 40 is/are allowed.
- 6) ☒ Claim(s) 13-16,19-22,25,26,28,30,31,34,37,38 and 41-45 is/are rejected.
- 7) ☒ Claim(s) 23,24,27,29 and 1718 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Claims 13 – 16, 19 – 22, 25, 26 are rejected under §103(a) as obvious over Bonville and Miller. USP 6156084 to Bonville describes a process for the desulfurization of an engine fuel onboard a motor vehicle, comprising: contacting an engine fuel comprising sulfur-containing components, e.g., gasoline, diesel fuel, naphtha, or light hydrocarbon fuels which contain relatively high levels of organic sulfur compounds, with a nickel reactant (see Abstract). In the course of contacting the fuel with the nickel reactant, the sulfur-containing components are separated from the engine fuel, thereby obtaining a low-sulfur fuel for use by the motor vehicle. Subsequent to the desulfurization step, the desulfurized fuel is fed to an autothermal reformer 20 comprising an iron oxide catalyst deposited on lanthanum-stabilized alumina. Bonville does not describe or suggest used of a selective liquid-phase adsorption material comprising an oxide of Al, Mg, Si, or Ti that is doped with Ag.

USP 4738771 to Miller describes desulfurization of reformer feedstocks, such as naphthas, using a selective liquid-phase adsorption material comprising an oxide of Al, Mg, Si, or Ti, e.g., alumina or the mixed oxide of silica-alumina, that is doped with Ag. See also US Pub. No. 20020043484 describing promoter metal silver on zinc titanate support.

It would have been obvious to have substituted Miller's step of selective liquid-phase adsorption using silver-doped alumina adsorption material because the skilled artisan would have recognized that Miller's silver-doped alumina liquid adsorption

approach to desulfurization was a functional equivalent of Bonville's desulfurization technique.

Alternatively, it would have been obvious to have mounted Miller's system onboard a motor vehicle because Bonville teaches that gasoline, diesel fuel, or naphtha desulfurization devices can advantageously be mounted onboard the motor vehicle to which desulfurized and reformed fuel is fed for use in motoring the vehicle. Per claim 14, the Miller adsorption material has a surface area of about 100 m²/g. Per claim 15, the adsorption material is alumina (Al₂O₃). Per claim 16, Miller also describes use of the mixed oxide silica-alumina (col 3 line 19). Per claim 19, the engine fuel is selected from the group consisting of petrol, diesel fuel, kerosine, and methanol, i.e., gasoline or diesel fuel. Per claim 20, Bonville describes desulfurized fuel tank 100. Per claim 21, Bonville describes immediately using the desulfurized fuel. Per claim 22, the adsorption material is arranged in series with a fuel pump. Per claim 25, it was known to regenerate the adsorption materials once spent. It would have been obvious to have regenerated the sulfur-containing adsorption material onboard the motor vehicle once the sulfur-adsorbing capacity of the material diminished to an uneconomical point. Per claim 26, it would have been obvious to have replaced the sulfur-containing adsorption material once spent or exhausted of sulfur-adsorbing capacity.

Claim 28 is rejected under §103(a) as obvious over Bonville and Miller and Lisieur. Per claim 28, it was conventional to provide catalytic converters to remove NO_x from the vehicle motor exhaust gases, as shown for example by USP 6129835 to

Lesieur. Accordingly, it would have been obvious to have continued doing the same once the additional capability of desulfurizing the fuel was provided.

In claim 13, "low-sulfur fuel" is taken to mean a fuel contacted with the selective liquid-phase adsorption material comprising an oxide of Al, Mg, Si, or Ti that is doped with Ag from which at least some organic sulfur compounds have been removed. Similarly, "relatively high levels of organic sulfur compounds" means a level of organic sulfur compounds that is higher than the level of organic sulfur compounds in the fuel after having been contacted with the selective liquid-phase adsorption material comprising an oxide of Al, Mg, Si, or Ti that is doped with Ag.

Claim 21 is rejected under §112(2) for failing to particularly point out and distinctly claim the subject matter for which patent protection is sought. None of claim 21 itself, the specification, or the prior art provides any meaningful standard by which to judge how soon in time a desulfurized fuel must be used by the motor of the motor vehicle to satisfy the "Immediately us[e]" limitation of claim 21.

Claim 17, 18, 23 – 24, 27, 29 are objected to as being dependent on a rejected base claim, but would be allowable over the prior art if presented in independent form. Per claims 17, 18, 44 – 45, various references describe processes for the desulfurization of an engine fuel, e.g., USP 6130081 to Konishi or USP 6461859 to Dehalt, comprising: contacting an engine fuel comprising sulfur-containing components with a selective liquid-phase adsorption material, wherein the adsorption material is a biogenic material, e.g., an enzyme (Duhalt) or bacterium (Konishi); and separating the

sulfur-containing components from the engine fuel, thereby obtaining a low-sulfur fuel, but they do not suggest such a biogenic material onboard a motor vehicle.

Claims 30 – 34 are allowable over USP 4419968 to Lee. Lee describes a process for desulfurizing a fuel and using desulfurized fuel for the internal combustion engine of a motor vehicle, the process comprising: using a TiO₂-based adsorption unit (22, 26) to reduce the sulfur, e.g., H₂S, content of the fuel, wherein the adsorption unit (22, 26) is placed onboard the motor vehicle; and regenerating the adsorption unit using heat and oxygen contained in engine exhaust gases. There is no suggestion that at least one of engine coolant and engine oil should be used to supply the heat and oxygen necessary to regenerate the desulfurization reactors. Claim 31 is allowable over Lee for the same reasons as claim 30. Moreover, per claim 32, Lee describes a process for desulfurizing a fuel and using desulfurized fuel for a motor vehicle, the process comprising: using an adsorption unit to reduce the sulfur content of a fuel, wherein the motor vehicle has a main fuel line and a bypass fuel line in parallel with the main fuel line, and wherein the adsorption unit is placed in the bypass fuel line. Lee does not teach or suggest, however, using the fuel of reduced sulfur content as engine fuel **only** when the engine is in a lean-burn mode. While USP 6293094 to Schmidt teaches that lean-burn mode is “normal” (i.e., not “start-up / heat-up) mode, it does not suggest using reduced sulfur content fuel only during lean- or normal-burn mode. Claim 33, requiring *inter alia* that the adsorption unit has an adsorption material that has an internal surface area of from 10 to 1600 m²/g, is allowable over Lee for the same reasons as claim 32.

Claim 34, which requires *inter alia* that regenerating the adsorption unit uses heat from at least one of engine coolant and engine oil, is allowable over prior art for the same reasons as claim 30 or claim 32.

Claims 35-43 are allowable over art. USP 6530216 to Pott is cited of interest.

Claims 31, 33, 36 are objected to for minor informalities: The "2" in "m²/g" should appear as a superscript, as in "m²/g." Applicants should not rely on the examiner to correct this obvious typographical error by informal or formal examiner's amendment. Correction by applicants is required.

Claims 30 – 31, 34, 37 - 38, 41 - 43 are rejected under 35 U.S.C. § 112(1st paragraph) for failure of the original disclosure to provide an adequate written description of the claimed subject matter. The foregoing claims require that "at least one of engine coolant and engine oil" provides the heat for regenerating the adsorption unit. The expression, "at least one of engine coolant and engine oil," means: 1) engine coolant, 2) engine oil, or 3) both engine coolant and engine oil. At least page 2 line 25 of the specification provides ample support for (1) or (2), but does not support, i.e., "provide an adequate written description," (3) to such an extent that the skilled artisan would have understood that applicants were in possession of the claimed subject matter. The examiner understands that *ipsis verbis* support is not required under 112(1ST) (description) to show possession of an invention, but in this case nothing at page 2 line 25 or Fig. 3 adequately communicates possession of the embodiment (3) subject matter. Note, importantly, that Fig. 3 uses the term "heat-transfer medium" (not

"media"). Further, note the conspicuous absence of segregated heat transfer conduits (one for engine coolant, one for engine oil) that the skilled artisan would have expected applicants to have described if indeed they were in possession of an embodiment in which both engine coolant and engine oil were used as heat transfer media. This rejection may be overcome with respect to this point by amending "at least one of engine coolant and engine oil" to "[at least one of] engine coolant [and] or engine oil."

Respectfully –

CHESTER T. BARRY
PRIMARY EXAMINER

A handwritten signature in cursive script, appearing to read "Chet", written in black ink.

Chester T Barry

Patent Examiner

703-306-5921